

# **North American Technology and Industrial Base Organization (NATIBO)**



## **Technology and Industrial Base Sector Studies January 1995 to Present**

**Prepared by:  
National Systems Management Corporation  
4600-H Pinecrest Office Park Drive  
Alexandria, VA 22312**

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## **TECHNOLOGY AND INDUSTRIAL BASE SECTOR STUDIES**

### **FOREWORD**

This publication is a compilation of technology and industrial base sector studies published or made available between January 1996 and the present. Included are studies by the military services and civilian government agencies. For each study, a brief abstract is provided, along with the date of the report, the sponsor or originating agency, and where it can be obtained. The NATIBO does not service or provide copies of the studies. If you are interested in obtaining a copy of a study, refer to the originating agency or distribution information for each study. Limitations on availability are noted in the distribution statement and are controlled by the originating agency.

The NATIBO mandate is to promote activities by government and industry that support and develop the North American technology and industrial base. The purpose of this publication is to foster the exchange of information concerning various sectors of the industrial base between the U. S. military services and civilian agencies and their Canadian counterparts.

Industrial base sectors can be viewed either horizontally -- by looking at business entities that produce common items, such as advanced materials; or vertically -- by looking at entities that contribute at varying levels to the production of an end item or system, such as a tactical wheeled vehicle. This document contains study reports that cover industrial base issues from both perspectives, some covering an entire military or civilian industry that contributes to the health of the industrial base and the economy, and some focused on a specific defense-related requirement. However, this publication should not be considered all-inclusive; rather, it should be viewed as an indicator of the data that is available, much of it on the worldwide web.

Other study report abstracts will be added to the site approximately every six months. Contributions of information that will enable the NATIBO to enhance and enlarge this collection of technology and industrial base studies are welcome. Please provide the information requested on the attached form and forward to Mrs. Nancy Hoesly, U. S. Army Materiel Systems Analysis Activity, ATTN: AMXSY-LS, Rock Island, IL 61299-7260. Mrs. Hoesly can be reached by E-mail at [nhoesl@ria-emh2.army.mil](mailto:nhoesl@ria-emh2.army.mil); or by FAX at (309) 782-7170.

## TECHNOLOGY AND INDUSTRIAL BASE SECTOR STUDIES

### Technology and Industrial Base Sector Study

<b>Title of Study</b>	
<b>Publication Date</b>	
<b>Originating Agency</b>	
<b>Distribution Point of Contact</b>	
<b>Distribution Limitation</b>	

**Abstract of Study:**

## TABLE OF CONTENTS

### **Aerospace, Aircraft & Missiles**

- ◆ Space Industry Study [1998]
- ◆ Aircraft Industry Study Report [1998]
  - Strategic Systems Industrial Base [May97]
- ◆ Canadian Aircraft Industry Study [1997]
  - National Security Assessment of Emergency Aircraft Ejection Seat Sector [96-97]
  - Space and Missile Systems Sector Industrial Base Analysis [Mar96]
  - Organic Industrial Base Lower Tier Analysis (Aircraft) [Mar96]
  - U.S. R&D Policy for Competitiveness Sector Study: Aircraft [1996]
  - Space Industry Study Report [1996]
  - Aircraft Industry Study Report [1996]

### **Electronics, Communication & Information Technology**

- ◆ Electronics Industry Study [1998]
- ◆ Information Industry Study [1998]
- ◆ Microwave Power Tube Technology Industrial Assessment [Apr97]
  - Critical Technology Assessment of the U.S. Semiconductor Materials Industry [Apr97]
  - Collaborative Virtual Prototyping Sector Study [May96]
- Electronics Industry Study Report [1996]
- U.S. R&D Policy for Competitiveness Sector Study: Electronics [1996]
- Information Industry Study Report [1996]

### **Energy & Environment**

- Effect of Imports of Crude Oil and Petroleum on the National Security [96-97]

### **Materials**

- ◆ Strategic Materials Industry Study [1998]
- ◆ Corrosion Detection Technologies Sector Study [Apr97]
  - Ion Beam Processing Technologies Sector Study [Jun96]
  - Ceramic Armor Sector Study [May96]
- Integrated Capability Assessment of the U.S. Composites Corporation [Apr96]
- Advanced Materials Technology Industrial Base: An Analysis and Assessment of Specialty Metals and Advanced Composites [Jan96]
- Advanced Materials Industry Study Report [1996]

### **Munitions**

- ◆ Munitions Industry Study [1998]
  - National Security Assessment of the Cartridge & Propellant Actuated Device Industry [96-97]
  - Defense Ammunition: Significant Problems left Unattended Will Get Worse [Jun96]
  - Ammunition Industrial Base: Information on DOD's Assessment of Requirements [May96]
- Munitions Industry Study Report [1996]

## **Nuclear, Biological, and Chemical (NBC)**

Joint Service Industrial Assessment for the NBC Defense Sector [Aug96]

Department of Defense NBC Warfare Defense [Apr96]

Meeting the Challenge - U.S. Industry Faces the 21<sup>st</sup> Century - The Chemical Industry [Jan96]

U.S. R&D Policy for Competitiveness Sector Study: Chemical [1996]

Biotechnology Industry Study Report [1996]

## **Overall Industrial Base**

Report on the Effects of Mergers in the Defense Industry [Mar97]

Estimates of Emergency Operating Capacity in U.S. Manufacturing  
Industries: 1994-2005 [Feb97]

## **Shipbuilding**

◆ Shipbuilding Industry Study [1998]

Shipbuilding Industry Study Report [1996]

## **Tracked and Wheeled Vehicles**

◆ Land Combat Systems Industry Study [1998]

◆ Amphibious Assault Vehicle Aluminum Hull Capability Study [Jul97]

Tactical Wheeled Vehicle Industrial Capability Assessment [Feb96]

Land Combat Systems Industry Study Report [1996]

## **Transportation**

Transportation Industry Study Report [1996]

U.S. R&D Policy for Competitiveness Sector Study: Automotive [1996]

## **Weapon Systems**

## Space Industry Study

**Date:** 1998

**Source:** Industrial College of the Armed Forces  
National Defense University, Washington, DC

**Availability:** <http://www.ndu.edu/ndu/icaf>

**Abstract:**

The global space industry is burgeoning. For the first time, the commercial sector's share of the space market has surpassed that of government. This trend will continue, driven by soaring demand for commercial communications and by a host of emerging technologies such as remote sensing and geographical information systems. According to an Air Force Space Command Brief, "...just as oil drove the engine of yesterday's Industrial Society space will drive tomorrow's Information Society." This new era presents a plethora of opportunities and risks for the US space industry and for the Nation's security. A fine line must be tread, for example, between protecting critical US technologies and falling behind in a fiercely competitive international market, thereby jeopardizing future national capabilities. The space industry has the potential either to promote international cooperation and mutual benefits for all nations or to create global winners and losers. Sound policy choices must be made now to successfully leverage the commercialization of space and to build for the future.

This study examines ways to leverage the commercialization of space to ensure continued US industrial competitiveness and unfettered access to space for national security purposes. It compares US space policy, government, and private sector investments and overall industry trends to those in the international space industry, notably in France and Russia.

The study team visited 17 domestic sites, both private and Government, and 18 Russian and French educational institutions, government ministries, and private companies.

## **Aircraft Industry Study**

**Date:** 1998

**Source:** Industrial College of the Armed Forces  
National Defense University, Washington, DC

**Availability:** <http://www.ndu.edu/ndu/icaf>

### **Abstract:**

The domestic aircraft industry is one of the US strongest strategic assets that underpins our national defense and economic power. The strength of US national security strategy rests on America's unmatched heavy lift and combat airpower. Aircraft production is a crucial component of the economy, generating 1.2% of GDP and 6.5% of US export sales. The global industry is coping with significant restructuring, shrinking supplier base, increased international competition, and divergent market trends for commercial and military aircraft, and changing government roles. The industry restructuring is occurring as companies merge and shed noncore business activities to reduce costs and become more competitive in the global market. Some countries are undergoing increased privatization of their industries, while others are dealing with an expanded government role in protecting key industrial capabilities. This analysis focuses on these challenges and their impact on the fixed wing, rotary wing, and engine sectors of the industry.

In the course of the study, the team visited 15 private industry sites and domestic associations, and 8 private firms and government agencies in France and the UK.

## Strategic Systems Industrial Base

**Date:** May 1997

**Originating Agency:** U.S. Air Force Air University  
Authors: James L Barefield II and Anthony R. Williams

**Distribution:** Defense Technical Information Center  
8725 John J. Kingman Road, Ste 0944  
Ft. Belvoir, VA 22060-6218

**Abstract:**

A significantly reduced defense budget has generated concern on the continuing viability of the defense industrial base. This study focuses on the industrial base's current and future capabilities to design, develop, and produce new bomber, sea launch ballistic missile (SLBM), and intercontinental ballistic missile (ICBM) systems as well as the base's ability to maintain the current inventory of these systems. While identifying existing limitations that may affect the nation's ability to procure and maintain these systems, it also presents some possible solutions to mitigate any erosion identified in the industrial base.

The study is the result of concern on the part of United States Strategic Command (USSTRATCOM) regarding the nation's future ability to produce new strategic systems in addition to maintaining current strategic weapon systems. It examines the core industrial capabilities associated with bomber and SLBM/ICBM systems to determine whether these capabilities are dependent upon continued production; to establish whether industry presently has the ability to restart production; and, assesses industry's ability to maintain current strategic weapons systems. Included are historical trends in research, development and procurement budgets; production histories; new program starts; programmed sustainment profiles; and current industry size, structure, and financial viability.

## **Canadian Aircraft Industry Study**

**Date:** 1997

**Source:** Industry Canada  
Technology Partnerships Canada

**Availability:** <http://strategis.gc.ca/SSG>

### **Abstract:**

The Canadian aircraft industry consists of approximately 200 plants employing approximately 40,000 workers. Industry shipments are approximately \$5–6 billion annually. The industry's output includes an impressive range of high-technology, proprietary products such as Canadair's Regional Jet transport and Challenger and Global Express business jets, de Havilland's Dash 8 family of commuter transports, civil helicopters produced by Bell Helicopter Textron (Canada) and the family of small aircraft engines designed and produced by Pratt & Whitney Canada. Canadian firms also produce aircraft subsystems, structural components and other parts for aircraft companies in Canada, the United States and Europe, and carry out repair and overhaul on a wide range of aircraft, aeroengines and their parts.

While the number of smaller firms participating in the Canadian industry has increased over the past two decades, the largest 16 establishments (those with 500 or more employees) account for 75 percent of total employment and more than 80 percent of total production.

The relatively high level of foreign ownership and control distinguishes the Canadian aircraft and aircraft parts industry from its international counterparts. Approximately 45 percent of total industry revenues are earned by Canadian-owned companies, and 42 percent by U.S.-owned operations. An important prime manufacturer, Bell Helicopter, and over half of the second-tier organizations are foreign owned, predominantly by multinational aerospace and defence conglomerates. They encompass a varying degree of autonomy or integration with their parents, ranging from companies that have a full world product mandate for products they design, market and support (e.g. Pratt & Whitney Canada), to captive subsidiaries that rely primarily upon their parent's design and marketing capabilities (e.g. Boeing Canada and McDonnell Douglas Canada).

**National Security Assessment of the Emergency  
Aircraft Ejection Seat Sector**

**Date:** 1996-97 edition

**Originating Agency:** U.S. Air Force

**Distribution:** The Association for Manufacturing Technology,  
(703)827-1204

**Abstract:**

This assessment was conducted at the request of the U.S. Department of the Air Force. It studies the anticipated requirements for ejection seats over the next several years and the potential impact that these requirements will have on the domestic capability for designing and producing ejection seats. The study was conducted in cooperation with ejection seat producers in Russia and the United Kingdom. It provides recommendations regarding the consolidation of the U.S. industry, development of the next generation seat technology, and U.S. involvement in international markets.

### Space and Missile Systems Sector Industrial Base Analysis

**Date:** March 1996

**Originating Agency:** Space and Missile Systems Center/SDF  
160 Skynet Street, Suite 2315  
Los Angeles Air Force Base, CA 90245-4683

**Distribution Limitation:** For Official Use Only

**Abstract:**

This Space and Missile Systems Sector Industrial Base Analysis provides an assessment of 248 of 494 key component suppliers which support the Defense Satellite Communication System (DSCS), Defense Meteorological Satellite Program (DMSP), Defense Support Program (DSP), Global Positioning System (GPS), and Titan IV. The ability of these contractors, identified during previous studies, to continue supporting Space and Missile Systems Center (SMC) programs is the focus of the study. This report provides an update of previous evaluations and revisits issues and concerns highlighted in them. The ultimate goal is to provide early risk identification and solicit corrective actions to prevent supplier-centered problems from impacting cost, schedule, performance, quality, or reliability. Suppliers' lead times are increasing and costs are on the rise. Manufacturers responding to this study indicated that pricing fixed cost contracts is virtually impossible because of the instability of raw material prices. Military specification and Environmental Protection Agency requirements continue to be points of contention for suppliers. Respondents stated that they are having difficulty supporting military products which require outdated processes and materials. Profit margins for military products are shrinking and cash flow problems are on the rise. Commercial manufacturers have made or are making the shift to EPA-approved processes and are using less stringent specifications. If given a choice of markets, suppliers favor the less restrictive and environmentally safer commercial market. Eleven companies have moved completely out of government business and eighteen others have closed. If this trend continues as the budget decreases, lead times will undoubtedly increase and the cost of critical components may become prohibitive.

## TECHNOLOGY AND INDUSTRIAL BASE SECTOR STUDIES

### Organic Industrial Base Lower Tier Analysis for Aircraft

**Date:** March 1996

**Originating Agency:** Wright Laboratory  
MTA  
Wright-Patterson AFB, OH 45433-6503

**Distribution Limitation:** For Official Use Only; Proprietary Information

**Abstract:**

Information on 160 companies is included in this study. Of the 124 companies reporting sales data, 70 reported less than \$10M annually; 34 reported \$10M to \$50M per year; and 20 had more than \$50M. Eighteen reported a decrease in sales, averaging 21 percent. Of the 123 companies which broke down their sales data between military and commercial, military sales accounted for an average of 48 percent. Forty-six companies reported suffering a reduction in force in the past three years. Of the companies visited, 97 reported percentage of facility capacity utilized. Twenty-four are using less than 50 percent; 43 use 50-80 percent; and only 30 companies utilize more than 80 percent. It should be noted that judgments can only be drawn from the data provided by the companies visited. Extrapolation of those data to the entire production base supporting the Air Logistics Commands cannot be sustained by logic. This is because data provided by the companies surveyed cannot be quantified in terms of effect on production and sustainment, unless all other suppliers capable of producing an equally acceptable part or component are known. The study recommended the establishment of a centralized process or organization to conduct and coordinate similar study efforts, utilizing state of the art technologies and communications networks, such as an Internet Homepage.

### U.S. R&D Policy for Competitiveness Sector Study: Aircraft

**Date:** 1996

**Originating Agency:** National Institute of Standards and Technology (NIST)

**Distribution:** [http://nii.nist.gov/pubs/coc\\_rd/apdx\\_air.html](http://nii.nist.gov/pubs/coc_rd/apdx_air.html)  
Council on Competitiveness, (202) 682-4292

**Abstract:**

This report examines the precipitous fall and changing distribution of funding for U.S. industrial R&D in the aerospace industry, because of both reductions in military spending and company cutbacks. Competition from abroad and cuts in the defense budget are forcing U.S. firms to shift focus from high performance to affordability.

Today, the aerospace industry is at a critical juncture. For three straight years sales have fallen, reflecting a sluggish domestic airline industry characterized by cost-cutting, bankruptcies and overcapacity. Meanwhile, U.S. defense cuts have reduced military demand, which had previously helped companies ride out downturns in the commercial sector. Total funding for industrial research and demand (R&D) in the aerospace industry has fallen precipitously since 1988, due primarily to federal reductions in military funding, but also to company cutbacks.

As industry becomes more risk averse, government is under increasing pressure to aid in the development of high-payoff, applied commercial technologies. In fact, recent studies have suggested that two of the biggest roadblocks to improving U.S. competitiveness in the commercial aircraft industry are the lack of government investment in aeronautics materials and manufacturing technologies for subsonic aircraft, and the increasing inability of suppliers to invest in new materials and processes due to defense cuts and their loss of commercial market share. However, government is attempting to increase its own level of collaboration with the aircraft industry and foster greater intra-industry cooperation.

The application of new information technologies will continue to have an enormous impact on both the product and the R&D process in the aircraft industry. Government must strike a better balance between the short-term work industry needs in order to compete effectively in today's marketplace and the longer-term research that will ensure continued technological breakthroughs for future generations.

## Space Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/icaf/isspa.html>

### **Abstract:**

This study examines the potential for the United States to privatize and commercialize selected aspects of the space industry to ensure continued U.S. global dominance of space in an increasingly competitive international marketplace. With well-defined and culturally appropriate visions and plans, other nations have successfully leveraged government and industry partnerships to forge world-class firms and satisfy their national interests. The United States should do the same.

The space industry has evolved in interrelated yet distinct interactions among four major sectors--launch vehicles, satellites, satellite operations, and applications--for which sales approach \$70 billion a year. Although initially supported completely by the government, commercial space today is rapidly growing and will soon command a sales majority. Of this growing enterprise, foreign entities have already cornered over 60 percent of the market.

Space applications, whether commercial or military, can be defined as the products and services provided by space assets. While these products and services are either collected (e.g., imagery) or transmitted (e.g., telecommunications) by satellites in orbit, the vast potential commercial opportunities for space applications lie in the exploitation of these data for defense or for the general well-being of the nation.

The space industry plays a strategic role in the nation's future. The application of space technologies in future military operations will facilitate a U.S. global presence, knowledge on demand, space control, and power projection. All of these developments are made possible by designing spacecraft with modern, low-cost techniques, adapting innovative architectures that incorporate distributed satellite systems, developing affordable access to space, and embracing commercial standards in acquisition practices. Although the White House announced a National Space Transportation Policy that attempted to improve the nation's launch situation, no strong national space strategy with a far-reaching vision has emerged. The first and foremost need is to establish a strong national vision and a strategic plan that integrates all activities in space: military, civil, and commercial.

### Aircraft Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/icaf/isair.html>

**Abstract:**

The study team assessed the global competitiveness of the U.S. aircraft industry in four major sectors: commercial transport, military fixed-wing aircraft, civil and military helicopters, and aircraft engines. Within these sectors, three key subsectors were examined: design and integration, advanced materials, and avionics/flight controls.

As one of the largest earners of export dollars in the economy, the U.S. aircraft industry is clearly a nationally important strategic industry. However, while buying cycles in the commercial and military segments formerly offset each other, since the end of the Cold War, spending in both sectors has declined. Fewer sales and lower production have forced manufacturers to restructure and downsize their operations, including a massive reduction in the skilled work force. Surge capability is still available, but the average time to produce significantly more aircraft is estimated at two years.

Despite the worldwide aircraft industry downturn, most manufacturers look forward to a positive future because of the aging military and commercial fleets. However, to retain their current 60% market share, U.S. companies will have to focus monetary and managerial resources on some key areas: computer-based design, integration, configuration control, and manufacturing; flexible manufacturing for efficiently producing multiple products at low volume; marketing methods that demonstrate advanced concepts; and increased customer orientation.

Continued support from the government and changes in some government policies could help ensure the success of the aircraft industry: continued support of the dual-use approach that merges civil and military practices in technologies critical to both defense and commercial enterprises; providing incentives for investing in high-technology facilities and advanced manufacturing equipment; partnering to develop programs that produce skilled, knowledgeable workers; reforming regulations and acquisition policies that impose unnecessary and costly procedures and restrictions on contractors; streamlining acquisition by adopting the best commercial procurement and accounting practices; rewarding pioneering companies by adopting their products, processes, and commercial standards; providing tax incentives for greater capital investment; and reforming tax laws to shorten depreciation cycles to reflect rapidly decreasing capital equipment life cycles.

## **Electronics Industry Study**

**Date:** 1998

**Source:** Industrial College of the Armed Forces  
National Defense University, Washington, DC

**Availability:** <http://www.ndu.edu/ndu/icaf>

### **Abstract:**

The electronics industry is multifaceted – from children’s game software to elements of major weapons systems. It includes many of the most innovative and profitable companies in the US, but embodies some of the biggest problems facing the nation—a paucity of trained technical workers; issues of market control; problems associated with rapid obsolescence, particularly of military components; and concerns about international alliances and national power. The computer and semiconductor sectors are among the most robust in the world, generating billions in profits and ushering hundreds of millions of people into the 21<sup>st</sup> century. Computers are becoming ubiquitous; soon it will be practically impossible to tell where the computer ends and the home appliance, entertainment unit, medical apparatus or communications device begins. The software sector continues to feature innovation and excitement unknown in most industries. It is impossible to imagine any realm of life that the electronics industry is not changing profoundly.

In the course of the study, the team visited 12 U.S. companies, and 15 government, association, and corporate sites in corporate sites in Israel and Turkey, including international divisions of U.S. firms.

## **Information Industry Study**

**Date:** 1998

**Source:** Industrial College of the Armed Forces  
National Defense University, Washington, DC

**Availability:** <http://www.ndu.edu/ndu/icaf>

### **Abstract:**

The information industry is a cornerstone of America's economy and national security. Dramatic growth and expansion of the industry are likely in the 21<sup>st</sup> century, as computers, telecommunications technologies, and innovative information services continue to converge and evolve rapidly, and transform the way we live and work. The American information industry remains preeminent in an increasingly global market. Still, the industry must address key challenges to maintain American preeminence. The nation's educational system is not meeting the industry's ever-expanding need for trained professionals, leading to a growing reliance on foreign talent. Another challenge is protecting the national information infrastructure from attack or catastrophic malfunction. Government must work with industry to resolve these and other issues, which include protecting intellectual property rights, ensuring fair competition within and among domestic industries, reducing unnecessary regulation, and actively supporting industry's interests in multilateral and bilateral trade arenas.

In the course of the study, the team visited 16 U.S. companies, and 15 government and industry sites in China and Japan, including international divisions of American companies.

## **Microwave Power Tube Technology Industrial Assessment**

**Date:** April 1997

**Source:** Department of Defense, Washington, DC

**Availability:** Document No. ADA323772/NAA,  
Defense Technical Information Center  
8725 John J. Kingman Road  
Ft. Belvoir, VA 22060-6218

### **Abstract:**

Microwave power tubes are used to generate and amplify microwave energy for a variety of uses, such as klystrons, traveling wave tubes, and cross-field amplifiers in land, sea, air, and space applications, and for electronic warfare and telecommunications systems. Department of Energy (DOE) uses large, high-power klystrons to power particle accelerators used in high-energy and nuclear physics research. DoD conducted this assessment, with DOE participation, to determine the effects of significant reductions in defense spending on the microwave power tube industry. It concluded:

- The same manufacturers provide microwave power tubes to DoD, civil Government agencies, and commercial customers. Klystrons used for DoD and DOE applications call for industrial capabilities common to the industry.
- Sales of the tubes declined 62 percent between 1985 and 1995 due to reductions in defense spending.

The U.S. tube industry has restructured but reports it is profitable. Current industrial capabilities are adequate to meet DoD requirements. However, because of uncertainties in future DoD system requirements, it is difficult to project the types and quantities of tubes that will be required in future years.

## **Critical Technology Assessment of the U.S. Semiconductor Materials Industry**

**Date:** April 1997

**Originating Agency:** U.S. Department of Commerce  
Strategic Analysis Division

**Distribution:** <http://www.bxa.doc.gov/natlsecr/htm#index8>  
National Technical Information Service

### **Abstract:**

The first five years of the 1990s were a period of tremendous growth for the semiconductor materials industry. The increase in production of computers swelled the need for semiconductors, as did the significant increase in semiconductor orders from the communications industry, various consumer products manufacturers, and the automotive industry. The U.S. re-emerged over Japan as the largest producer of semiconductors in 1995. As a result, most segments of the U.S. semiconductor materials industry – manufacturing equipment, components and parts, and raw materials – were healthier in 1995 than in 1991.

Global competition has impaired one significant area of the U.S. semiconductor materials industry. Total shipments of domestic packaging materials declined in several important areas between 1991 and 1995. In addition, total research and development in this area fell a dramatic 94 percent during the same time period. The decline in R&D was indicative of the abandoned effort of the two U.S. companies to challenge the foreign domination of the U.S. ceramic materials industry. The episode demonstrates that even in a time of sharply increasing demand for semiconductors, global competition has itself also correspondingly increased.

## Collaborative Virtual Prototyping Sector Study

**Date:** May 1996

**Originating Agency:** The North American Technology and Industrial Base Organization (NATIBO)

**Distribution:** <http://www.dtic.mil/natibo>

### **Abstract:**

The purpose of this sector study was to assess the maturity, level of use, utility, and viability of Collaborative Virtual Prototyping (CVP), a collection of technologies that enables the establishment of an integrated and simulated acquisition environment. Despite the apparent potential of CVP to support improvements in the weapon system process, numerous questions remain: the existence of technological, cultural, and policy barriers to implementation; the economics of implementing CVP and measurement of the benefits; and acceptance of CVP technologies within the defense development community. The report encompasses the collection and analysis of technical, business, and policy information related to CVP research efforts and industrial capabilities in both the U.S. and Canada, with a particular focus on the challenges faced by small- and medium-sized organizations in applying this emerging technology.

## Electronics Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu.ndu/icaf/isele.html>

### Abstract

This report presents a strategic perspective of the electronics industry and its role in supporting the materiel requirements of national defense, a comparative analysis of U.S. and foreign electronics companies in both defense and nondefense environments, and specific policy options that would enhance the electronics industry's preparedness.

The state of the U.S. electronics industry in 1996 shows significant optimism in contrast with the 1980s and early 1990s, when concern over the threat of unfair foreign competition alarmed the industry. Computer sales in 1995 were strong compared with 1994. In the semiconductor sector, where competition from Japan was particularly felt, U.S. companies have surged back at the cost of their Japanese and European competition. The consumer electronics sector is showing a very healthy rate of growth. The U.S. continues to dominate the global software industry. The U.S. defense sector is an ever smaller portion of output, with defense electronics sales representing less than 10 percent of the industry's total dollar volume. Consolidation leaves the firms remaining in the defense sector in a strong position, but engenders concerns over the consequences of sole source suppliers and diminishing sources for dated equipment.

Success on the battlefield of the future will depend on the availability of information. Modern warfare's command and control, intelligence, communications, logistics, and weapons systems will rely increasingly on electronics to provide the means to gain an information advantage. Some niche markets will have a relatively constant demand for highly reliable, high-technology military electronics. The challenge for defense planners through the year 2020 is to leverage commercial-sector development for military use.

### U.S. R&D Policy for Competitiveness Sector Study: Electronics

**Date:** 1996

**Originating Agency:** National Institute of Standards and Technology (NIST)

**Distribution:** [http://nii.nist.gov/pubs/coc\\_rd/apdx\\_elec.html](http://nii.nist.gov/pubs/coc_rd/apdx_elec.html)  
Council on Competitiveness, (202) 682-4292

**Abstract:**

This study focuses primarily on research and development trends in semiconductors, optoelectronics and flat panel displays (FPDs) – three critical building blocks of electronics systems that are expected to drive U.S. competitiveness in electronics markets over the next several decades. National governments have played a pivotal role in the electronics industry worldwide. Government support will remain vital to many nations' and companies' research and development efforts.

Traditionally, the Department of Defense has been the largest federal contributor to R&D in this sector. Justifying its support under the rubric of dual-use technology development, the DOD accounts for 88% of federal funding for FPD technology. Approximately \$645.7 million has been spent on FPD research over the past five years, although funding has dropped almost 39% from its 1994 peak of \$185.9 million. Government R&D funding influences optoelectronics to varied degrees. The U.S. government has substantial influence on the development of niche products through support for defense-relevant technologies and applications; and the development of small businesses.

Looking ahead, the fusion of electronics technologies has the potential to radically change the electronics industry. With the integration of the chip and the FPD, firms producing both will have a competitive advantage. Industry analysts believe FPDs will one day be as economically important as semiconductors are today. If this is so, the American electronics industry could be in danger. U.S. initiatives to enter this market seem futile given that Japanese firms now dominate the FPD market in display supplies, manufacturing equipment and know-how. In the meantime, teaming across the electronics industry will continue to be a primary contributor to economic competitiveness.

## Information Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/icaf/isi.html>

**Abstract:**

This report outlines principles and goals that provide a blueprint for federal government action relative to the information technology industry. The information industry is an essential strategic element of national power. It underlies all other industries and provides the infrastructure that enables their success.

Rarely in history has a single technological development experienced the phenomenal rate of growth that the information technology industry has. Societies around the globe rely increasingly on advanced telecommunications, computer, and other automated information systems in everyday life. Without question, information technology is a force for change—social, political, and economic. Access to information and an understanding of how to use new technologies not only are essential for economic success and national security but are basic abilities people need to function in the evolving global society.

Trends in productivity indicate that the U.S. information industry will continue to be among the fastest-growing sectors of the economy. Through its global operations, the U.S. computer industry already controls more than 75 percent of the world computer market. The government and other industries depend on the industry to develop innovative solutions to problems and to continue to increase productivity, efficiency, competitiveness, and employment in the United States.

In the short and long term, the information industry is postured to respond to the issues and challenges of the 21<sup>st</sup> century. In fact, technological and legal measures designed to secure data, protect networks, aid law enforcement, and help an industry ready to deal with the competitive and regulatory consequences of all these issues will steadily proliferate. The next step is for the government to define force requirements and capabilities in the arenas of information management and assurance as the basis for developing surge and mobilization policies to support national security resource requirements.

## Effect of Imports of Crude Oil and Petroleum on the National Security

**Date:** 1996-97 edition

**Originating Agency:** U.S. Department of Commerce  
Bureau of Export Administration

**Distribution:** The Association for Manufacturing Technology,  
(703)827-1204

**Abstract:**

At the request of the Independent Petroleum Association of America and several other industry associations, the Department of Commerce/Bureau of Export Administration (BXA) conducted an investigation under Section 232 of the Trade Expansion Act of 1962, as amended, to determine the effect of imports of crude oil and refined petroleum products on U.S. national security. The report found that since the previous Section 232 Petroleum finding in 1988, there had been some improvement in U.S. energy security. The breakup of the Soviet Union and the apparent disarray within OPEC have enhanced U.S. energy security. Lower oil prices on balance have benefited the U.S. economy. However, factors leading toward a contraction of the U.S. petroleum industry and, as a result, a growing import dependence, led BXA to find that petroleum imports threaten to impair the national security.

## **Strategic Materials Industry Study**

**Date:** 1998

**Source:** Industrial College of the Armed Forces  
National Defense University, Washington, DC

**Availability:** <http://www.ndu.edu/ndu/icaf>

### **Abstract:**

A fundamental shift in thinking has occurred in the US over the past 50 years concerning strategic and advanced materials. Historically, the focus has centered on national defense, but with the increased globalization of national economies, a broader concept of strategic and advanced materials has emerged. The new perspective asserts that national security planning encompasses the broad welfare of a society, which includes economic and political as well as defense considerations. This broad perspective on national security is evident in many countries. The mechanism driving the strategic materials industry in this regard is the global market economy. Economic growth and prosperity has emerged as a primary goal in our national security strategy. Strategic materials both enhance the growth of our economy and promote national security. Therefore, it is vital to US national security that it maintains a commitment to further and continue development of these strategic materials industries.

This study focused on two traditional strategic materials (aluminum and steel) and two types of advanced materials (ceramics and advanced composites). In the course of the study, the team visited 16 U.S. and Canadian, and 20 Austrian and Hungarian, companies and government agencies. This report highlights the changing conditions of the strategic materials industry in the US and selected other countries.

## **Corrosion Detection Technologies Sector Study**

**Date:** April 1997

**Source:** North American Technology and Industrial Base Organization  
(NATIBO)

**Availability:** NATIBO Web Site: <http://www.dtic.mil/natibo>

### **Abstract:**

This report provides the results of a study of corrosion detection technologies commissioned by the NATIBO and completed in March 1998. It analyzes present and emerging corrosion detection technologies and the industry outlook for these technologies; highlights land, sea, and air applications of corrosion detection technologies; identifies corrosion detection proponents, equipment developers, and researchers in government, industry, and academia; and pinpoints barriers and impediments to the expansion of corrosion detection technologies into the industrial base. From this analysis, the report provides a roadmap of recommendations for government and/or industry action to eliminate barriers and address issues hindering more widespread use of these technologies.

## Ion Beam Processing (IBP) Technologies Sector Study

**Date:** June 1996

**Originating Agency:** The North American Technology and Industrial Base Organization (NATIBO)

**Distribution:** <http://www.dtic.mil/natibo>

### **Abstract:**

This study identifies and assesses the maturity and applicability of ion beam processing (IBP) technologies to solve many metal surface finishing problems found in the industrial base. Despite the fact that ion implantation has found a commercial niche improving the wear properties of medical devices such as titanium hip and knee joints, and has been widely used for over 30 years in the semiconductor industry to provide precise control of semiconductor wafer manufacturing, IBP technologies have not been successful in penetrating other North American markets.

This study investigated mass analyzed ion implantation, the technique used in semiconductor manufacturing; direct nitrogen ion implantation; direct metal ion implantation; plasma source ion implantation; and ion beam assisted deposition. The report highlights the benefits of IBP, addresses the technological and socio-economic barriers preventing the adoption of IBP technologies, and provides recommendations for government and industry to more fully capitalize on the potential of IBP in the metal surface finishing industry sector.

## TECHNOLOGY AND INDUSTRIAL BASE SECTOR STUDIES

### Ceramic Armor Sector Study

**Date:** May 1996

**Originating Agency:** U.S. Marine Corps Systems Command  
Quantico, VA 22134-5010  
Phone: (703) 784-4550

**Distribution Limitation:** For Official Use Only;  
Business Sensitive and Proprietary Information

**Abstract:**

This study examined the supplier base for ceramic armor for possible use on the Advanced Amphibious Assault Vehicle (AAAV). The Army Research Laboratory, Alfred University, and ten subtier vendors were visited. The data was collected to assess the health of the industry. This effort is a follow-on to the AAAV study completed in June 1991. The conclusions of the study were that the ceramic armor industrial base is healthy and no government intervention is warranted at this time. Four suppliers were considered as likely candidates to produce the armor when required. Facility and capital equipment funding may be required in the future depending on which armor is selected. An update to this report is recommended after the prime and subtier vendors are identified.

## TECHNOLOGY AND INDUSTRIAL BASE SECTOR STUDIES

### Integrated Capability Assessment of the U. S. Composites Corporation

**Date:** April 1996

**Originating Agency:** Defense Contract Management Command  
Industrial Analysis Support Office  
Philadelphia, PA 19141

**Distribution Limitation:** For Official Use Only;  
Business Sensitive and Proprietary Information

**Abstract:**

This report identified three suppliers capable of producing the encasements for the Shoulder Launched Multipurpose Assault Weapon (SMAW). One of the companies was considered a high financial risk. The manufacturing technologies were determined to be *not unique* to any one supplier. There was a determination that there was no risk associated with the technologies. Recommendations were made that the supplier data be maintained in the USMC weapon system and program information systems and that it may be in the best interests of the Government to purchase the proprietary process from one of the suppliers and protect the equipment for future acquisition. The report was utilized by the SMAW-CP Source Selection Team in the award of a contract in September, 1996.

## TECHNOLOGY AND INDUSTRIAL BASE SECTOR STUDIES

### **Advanced Materials Technology Industrial Base: An Analysis and Assessment of Specialty Metals and Advanced Composites**

**Date:** January 1996

**Originating Agency:** Office of the Under Secretary of Defense (Acquisition and Technology)

**Distribution:** Defense Technical Information Center  
8725 John J. Kingman Road, Ste 0944  
Ft. Belvoir, VA 22060-6218

**Abstract:**

This study assessed the extent to which the commercial capabilities of the technology and industrial base for advanced materials can provide access to the leading edge technology products necessary to meet military requirements. The focus was on load carrying metal and composite structural materials that provide current or future advantages in military applications. The study, which was conducted within the context of the Defense Department's Dual Use Technology Strategy, examines whether commercial capabilities will be sufficient by themselves or whether their use is impeded by issues of affordability or availability of high-end technology.

## Advanced Materials Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/icaf/isadt.html>

### **Abstract:**

This report describes the advanced materials (AMATs) industry and market, current conditions and trends, and the ability of the industry to meet national security needs and to contribute to the economic well-being of the country.

The advanced materials industry produces materials with superior performance characteristics that enable end products to be better than those made from conventional materials; it does not produce the end products. Although the federal government, especially the Department of Defense, sponsored much of the original research and development of advanced materials, that funding has recently been reduced significantly. The report's findings include:

- Market forces will continue to drive the AMATs industry toward more commercially oriented R&D and products. Although the defense drawdown reduced the use of advanced composites and specialty metals overall, growth in the civilian use of AMATs has sustained some segments of the industry. Sporting goods and commercial space applications now dominate the market. Consequently, a few producers dominate segments of the industry.
- Although most AMATs producers have downsized and consolidated their businesses, and many have moved offshore, the U.S. AMATs industry still has the technological know-how, capital facilities, and experience to continue to be a global leader. However, the U.S. may have to deal with future dependency on transnational corporations or foreign sources.
- Large segments of the AMATs industry are not profitable. Significant overcapacity and idle high-value machinery are common, particularly in the titanium industry, where the titanium production of the former Soviet Union has garnered market share concurrently with U.S. defense procurement reductions.

Despite these trends, access by U.S. manufacturers to AMATs both for economic growth and to meet national security needs is not threatened. However, this strategic arena needs to be closely monitored from a national security perspective.

## **Munitions Industry Study**

**Date:** 1998

**Source:** Industrial College of the Armed Forces  
National Defense University, Washington, DC

**Availability:** <http://www.ndu.edu/ndu/icaf>

### **Abstract:**

The Munitions Industrial Base (MIB) includes conventional munitions, precision guided munitions (PGMs), weapons of mass destruction (WMD), and munitions of the future. Each presents unique industrial challenges to our ability to supply the munitions needed to support the National Military Strategy. The issue for conventional munitions is the US' ability to replenish our stockpile in time for a second conflict. The study group believes that the conventional MIB is able to provide adequately for the Nation's needs although specific areas require attention. For PGMs, the government must monitor the consolidation of the industry to ensure continued American technological superiority and fair competition. For the nuclear component of WMD, the issue is whether the Department of Energy will be able to assure the reliability of the warhead stockpile. Munitions in developmental stages must be pursued to provide our war fighters the best munitions possible. Foreign sales of US munitions and potential offshore purchases of munitions or components must be a key aspect of our industrial policy.

In the course of the study, the team visited 12 U.S., and 8 French and UK, companies, government agencies, and military installations.

## **National Security Assessment of the Cartridge and Propellant Actuated Device Industry**

**Date:** 1996-97 edition

**Originating Agency:** Naval Surface Warfare Center,  
Indian Head, Maryland

**Distribution:** The Association for Manufacturing Technology,  
(703) 827-1204

### **Abstract:**

This assessment addresses the health and competitiveness of the cartridge and propellant actuated device (CAD/PAD) industry. CAD/PADs are explosive devices used predominantly in weapon systems, performing such functions as aircrew ejection in emergencies, flare ejection, and bomb and missile releases, but also have a growing use in commercial applications, such as automobile airbags, emergency cutting tools, and fire extinguisher actuators. This assessment was undertaken at the request of the U.S. Navy's Naval Surface Warfare Center in Indian Head, Maryland. The Navy initiated the study out of concern for the long-term survival of the firms that supply these products.

The assessment found a one-third drop in the number of suppliers, a shrinking defense sector and a growing commercial sector, and that the small suppliers, who were most likely to rely on defense endmarkets, were in the worst financial condition. The study recommended that the Navy initiate bi-annual meetings with industry to build a closer working relationship with the remaining firms, to give information about the potential future demand, and to better understand the problems of industry. It was also suggested that the facility in Indian Head, MD, be used as a pre-shipping test facility, to help alleviate the delays that were uncovered in the study. Finally, the Commerce Department also introduced the remaining CAD/PAD firms to a potential new market, Department of Justice law enforcement programs, which will allow these firms to maintain defense capabilities while exploring other markets.

## **Defense Ammunition: Significant Problems Left Unattended Will Get Worse**

**Date:** June 1996

**Originating Agency:** General Accounting Office  
Report No. NSIAD-96-129

**Distribution:** <http://www.gao.gov/AIndexFY96/subject/Ammuni.htm>

### **Abstract:**

According to DOD, the ammunition stockpile, which is to meet peacetime needs and support two major regional conflicts, has no major shortages. However, there is no longer a requirement to surge the industrial base during conflicts. In addition, the most lethal, up-to-date, "preferred" munitions will be at a premium; some requisitions will be filled with older "substitute" ammunition items, but these items are considered adequate by DOD to defeat the threat that U.S. forces are expected to encounter.

DOD's position is based on a number of studies, including its 1994 and 1995 financial viability studies of the firms comprising the ammunition industrial base, which concluded that the base is adequate to meet DOD's continued production and replenishment requirements. DOD is confident in this position, even though it did not receive sufficient data to evaluate the financial condition of all the firms in the industrial base. Although the firms were not obligated to respond, the 57 firms that responded, and which were fully evaluated in the 1994 study, held about 75 percent of the production capacity in the industrial base. DOD assumed that the remaining 45 firms that did not respond were financially viable. DOD officials stated that if the firms were having financial difficulties, they would be motivated to respond. In their opinion, it would be in a firm's best interests to respond if it was having financial difficulties because that response would, in effect, be a request for DOD to help the firm remain viable.

An assessment of whether the ammunition industrial base is adequate for replenishment depends on the assumptions used. Because the underlying assumptions concerning replenishment levels and time frames form the basis of the services' ammunition requirements, changes to the Defense Planning Guidance could cause DOD's industrial base assessment to change even if production capacity within the industrial base remains stable. The sensitivity of the assessment to changes in assumptions is illustrated by other private studies that have concluded that the industrial base is inadequate to meet replenishment requirements during and following a national emergency. Those studies are based on underlying assumptions that differ considerably from the assumptions in the current Defense Planning Guidance.

**Ammunition Industrial Base: Information on DOD's  
Assessment of Requirements**

**Date:** May 1996

**Originating Agency:** General Accounting Office  
Report to Congress, No. NSIAD-96-133

**Distribution:** <http://www.gao.gov/aIndexFY96/subject/Ammuni.htm>

**Abstract:**

Pursuant to a congressional request, GAO reviewed the Department of Defense's (DOD) ability to meet peacetime ammunition requirements, and to replenish the ammunition stockpile following two major regional conflicts.

GAO found that: (1) since 1978, the production capacity of the ammunition industrial base has dramatically decreased; (2) while indirect fire munitions constitute the largest part of the war reserve inventory, the decrease in war reserve requirements since the end of the Persian Gulf War has caused the percentage of direct fire munitions to increase; (3) the distribution of funding between government-owned and contractor-owned facilities has remained steady since 1987; (4) the decline of ammunition funding has not caused any significant peacetime shortages; (5) substitute munitions or increased production rates can compensate for any understocked items; (6) no industrial base problems exist that would prevent replenishing the stockpile after the completion of those two regional conflicts; (7) if the response period is shortened or if the required replenishment level is raised, the industrial base may not be able to simultaneously meet peacetime ammunition needs and replenish the ammunition stockpile following the regional conflicts; and (8) private studies of the industrial base conclude that the industrial base is inadequate to meet munitions requirements after two major regional conflicts.

## Munitions Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/icaf/ismun.html>

### **Abstract:**

This report assesses the current state of the U.S. munitions industry, the challenges it faces, and its outlook. Data were gathered on most facets of the industry, from the extremely high-technology area of precision-guided missiles (PGM) to the lower technology production of bombs, explosives, and propellants.

Although the United States remains the world leader in munitions technology, the nation's ability to rapidly produce high-technology weapons on a large scale has diminished because of downsized military procurements and increased foreign competition. The report's findings include:

- The munitions industrial base continues to shrink as production requirements are reduced. Munitions producers will continue to use consolidation, cooperative arrangements, and global partnerships as an industrial survival strategy.
- Although the U.S. PGM stockpile is impressive, it does not include the sheer number of "preferred" weapons required to conduct two major regional contingencies (MRC). The addition of the global positioning system (GPS) family of guided munitions will improve this shortfall, but not before 2000.
- Although the success of U.S. weapons in the Gulf War made the U.S. the world's leading supplier of high-technology munitions, global competition has intensified to the point where the U.S. competitive advantage is eroding.
- New government-industry relationships are emerging because of the need for cooperation and partnerships. Industry cannot establish global partnerships unless the government removes impediments.
- The continuing shrinkage of the U.S. production base may eventually decrease the U.S. capability to replenish stocks and could result in dependency on foreign producers for replenishment.

The study group recommends the following:

- Authorize multiyear funding for munitions programs to provide needed stability.
- Fund service PGM requirements fully to support tomorrow's force structure.
- Stimulate munitions R&D efforts by removing obstacles and providing incentives.
- Continue collaborative partnerships with industry and move toward the privatization of the national laboratories.

In the final analysis, the munitions industry is troubled but not desperate. There is reason for concern, but no major government intervention is currently required.

**Joint Service Industrial Assessment for the Nuclear,  
Biological and Chemical (NBC) Defense Sector**

**Date:** August 1996

**Originating Agency:** Joint Service Material Group, Aberdeen Proving Ground, MD

**Distribution:** Defense Technical Information Center  
Ft. Belvoir, VA 22060-6218  
Document No. ADA324649

**Abstract**

This report attempts to capture a “snapshot” of the industrial health of the current and future Nuclear, Biological and Chemical (NBC) Defense Sector. The study is based on the requirement for the U.S. forces to fight two nearly simultaneous major regional conflicts. The purpose is to provide the Joint NBC Defense Board with a screening tool that identifies critical areas within the NBC defense sector of the DoD industrial base. This was accomplished by assessing the current and projected status of the four Services’ NBC defense materiel stockage (fielded items); research, development and acquisition (RDA) programs; and related critical technologies. Results of the study indicated that a significant portion of all items assessed fell in the moderate risk (adequate capabilities *may* exist) category. However, critical shortages in protective clothing, filters, medical supplies, and batteries for chemical defense equipment were identified. Furthermore, there are shortfalls in the inventory of nonmedical chemical defense equipment because of insufficient resourcing. The report concluded that the sector consists mainly of small businesses that do not sell to the commercial sector and further reductions in DoD spending will cause some of these businesses to close.

## TECHNOLOGY AND INDUSTRIAL BASE SECTOR STUDIES

### Department of Defense Nuclear/Biological/Chemical (NBC) Warfare Defense

**Date:** April 1996

**Originating Agency:** Department Of Defense, Washington, DC

**Distribution:** Defense Technical Information Center  
Ft. Belvoir, VA 22060-6218  
Document No. ADA322938

**Abstract:**

The National Defense Authorization Act for Fiscal Year 1994, Public Law No. 103-160, Section 1703, mandates the consolidation of all Department of Defense chemical and biological defense programs. As part of this consolidation, the Secretary of Defense is directed to submit an assessment and a description of plans to improve readiness to survive, fight and win in a chemically or biologically contaminated environment. This report contains modernization plan summaries which highlight the Department's approach to improve current NBC defense equipment and resolve current shortcomings in the program.

## Meeting the Challenge - U.S. Industry Faces the 21<sup>st</sup> Century - The Chemical Industry

**Date:** January 1996

**Originating Agency:** Department of Commerce  
Office of Technology Policy  
Washington, D.C.

**Distribution:** National Technical Information Service  
Order number PB96-138094CFK

### **Abstract:**

This report identifies the most important of the many interacting factors that will determine the future competitiveness of U.S. based chemicals R&D and production. It describes the contributions of the U.S. chemical industry to the U.S. economy, the structure and competitiveness of the industry, the key determinants of its current strength, and the factors most likely to determine its future performance.

Critical to the future competitiveness of the U.S. chemical industry will be its ability to maintain its technological edge. To do so it must continue and increase already high levels of investment in R&D and new plants and equipment (P&E). Maintaining the competitiveness of U.S. based R&D and production will require that rising amounts – and rising portions – of U.S. chemical industry P&E investment go to foreign countries.

Meeting the rising R&D and P&E investment needs of the future will require a chemical industry that is profitable and attractive to investors. While the industry's profitability will be determined primarily by individual company decisions, government decisions that influence the environment in which U.S. producers compete will also be increasingly critical to the industry's continued growth and competitiveness. In order to survive and grow, major U.S. and foreign chemical companies will have to compete globally, selling - and often investing and producing - in markets around the world. Increasingly, the United States will be competing with other countries to host chemical R&D and production. The benefits of an internationally competitive U.S. chemical industry to the U.S. economy make it critical to keep the industry strong. In an era of tightening competition, the margin for error in both company decisions and government policies will be narrower than ever before.

## U.S. R&D Policy for Competitiveness Sector Study: Chemical

**Date:** 1996

**Originating Agency:** National Institute of Standards and Technology (NIST)

**Distribution:** [http://nii.nist.gov/pubs/coc\\_rd/apdx\\_chem.html](http://nii.nist.gov/pubs/coc_rd/apdx_chem.html)  
Council on Competitiveness, (202) 682-4292

**Abstract:**

Since the 1980s, the chemical industry has seen significant restructuring and downsizing. One of the most important effects has been a general reduction in internal research and development (R&D) spending – some companies have even eliminated research laboratories. The industry has enjoyed solid growth in demand and recorded its best profit increases since the late 1980s. Production of most types of basic chemicals is high. Productivity is increasing after several years of industry downsizing, and prices are recovering from the lows of the past several years. After little or no growth during the 1990s, U.S. exports of chemical products increased by 10 percent in 1994, with all sectors of the industry posting substantial growth.

In the past, government laboratories' R&D agendas were shaped by the Cold War and often did not coincide with industry's needs. In spite of this, the chemical sector has always relied upon the government to help sponsor its R&D needs. Federal spending on chemical research, which has been growing 6 percent annually since 1987, rose an estimated 3 percent in 1994 to \$1.05 billion. The Department of Energy (DOE) is the largest government R&D contributor to the chemical industry, providing 20 percent of the government's total chemistry-related R&D outlay. Through Cooperative Research and Development Agreements, DOE labs transfer their spin-off technologies to industry, work with industry to develop specific product and process technologies that answer both government and commercial needs, and work with industry to develop breakthrough technologies in existing markets.

The chemical industry's long-term viability is dependent upon its capacity to continue making breakthrough discoveries – not just product upgrades and technical modifications. The way in which chemical companies have begun to ensure this capacity is to engage in leveraged partnerships with government, academia and other companies. Nonetheless, in an uncertain federal budgetary climate, companies must remember that ultimately, their R&D goals will have to be met by themselves.

## Biotechnology Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/ica/isbio.html>

### Abstract

The purpose of this report is to describe the applications, condition, and trends of the biotechnology industry against the background of national security requirements and military surge and mobilization needs.

Biotechnology products and processes are revolutionizing the health care, agricultural, industrial chemical, and environmental fields. This young, risky, industry holds endless promise for spin-off products, manufacturing processes in other industries, and sustainability for the future. Biotechnology is niche oriented, geared toward developing high-technology, high-quality, and less expensive products for mankind. The United States leads the world in biotechnology, but the industry is at a critical point in its development cycle and needs continued support for basic research. Just one new discovery can completely change the structure of the industry.

The industry's potential military applications range from biological defenses to new protective materials. At the more detailed level of military mobilization and surge, biotechnology does not correct all the problems in the industrial segments it affects, and it may raise new risks in some instances. As a new industry, biotechnology will apply new business management practices that closely size plant capacity, staffing, and inventories to market requirements. As such, the industry is not generally amenable to achieving economies of scale through high-quantity production. Additionally, the FDA approves products to be manufactured only at a certain production rate. Any change requires recertification, which is a lengthy process. As a result, the military cannot expect the industry to carry much excess capacity that could later be filled with mobilization orders. Current technology does not allow for easy switching of products within plants; normally, plants are dedicated to a single product. Over time, greater flexibility is expected, but the current situation limits the ability to surge production when mobilization requires. The industry provides high-quality, high-technology products but does not have the dexterity to expand quickly. A mobilization deficiency will exist unless the military takes measures to offset purely civilian market factors.

## Report on the Effects of Mergers in the Defense Industry

**Date:** March 1997

**Originating Agency:** Office of the Secretary of Defense, Washington, DC

**Distribution:** National Technical Information Center  
Ft. Belvoir, VA 22060-6218  
Document No.: ADA323934

**Abstract:**

Defense procurement outlays in constant dollars, i.e., adjusted for inflation, have declined 61 percent from 1987 to 1998. This decline has lowered contractor revenues and increased their excess capacity. Companies have responded to these developments in predictable ways -- reducing employment, closing facilities, reengineering processes to become more efficient, developing closer relations with their suppliers, and pursuing merger and acquisition opportunities. Section 826 of the National Defense Authorization Act for Fiscal Year 1997 requires the Secretary of Defense to conduct a study on mergers and acquisitions in the defense sector. It specifies that the study shall address: the effectiveness of defense mergers and acquisitions in eliminating excess capacity within the defense industry; the degree of change in the dependence by defense contractors on defense-related Federal contracts within their overall business after mergers; the effect on defense industry employment resulting from defense mergers and acquisitions occurring during the three years preceding the date of the enactment of this Act; and the effect on competition for defense contracts. This is the report to Congress on that study effort.

**Estimates of Emergency Operating Capacity in U.S.  
Manufacturing Industries: 1994-2005**

**Date:** February 1997

**Originating Agency:** U.S. Department of Energy  
Contract DE-AC06-76RLO 1830

**Distribution:** National Technical Information Service  
5285 Port Royal Road  
Springfield, VA

**Abstract:**

To develop integrated policies for mobilization preparedness, planners require estimates and projections of available productive capacity during national emergency conditions. This report is part of an ongoing study that supports the Federal Emergency Planning Agency (FEMA) and DoD mobilization planning studies. These findings are intended for use in planning models that are designed to predict the demands for industry sectors that would occur under conditions such as a military mobilization or a major national disaster. In forecasting emergency operating capacity for each of 458 industries, this report provides industry capacity projections that reflect continued downsizing of the defense establishment but modest growth in the remainder of the economy.

The report methodology used time series regression models based on industry data to obtain a response function of industry capital stock to levels of industrial output. The information in this report relies on the Census Bureau's recurring Survey of Plant Capacity. The unweighted average growth rate of capacity for all 458 industries from 1995 to 2005 is 2.3 percent per year. However, there is considerable dispersion in the growth rates across industries. Capacity in ten percent of the industries is projected to decline over the next decade, while in 65 industries, capacity is expected to grow by more than 5 percent per year.

## **Shipbuilding Industry Study**

**Date:** 1998

**Source:** Industrial College of the Armed Forces  
National Defense University, Washington, DC

**Availability:** <http://www.ndu.edu/ndu/icafe>

### **Abstract:**

This paper documents the results of a five-month study of US naval and large ship, commercial shipbuilding. The study focused on the industry's current condition, challenges and outlook, and the goals and role of the US government.

US shipbuilders are without peer in their ability to produce the world's best military ships. To maintain the best Navy in the world, America must sustain the indigenous capability to continue building these warships. Currently, the Major Shipbuilding Base can provide the nation with the navy ships it needs. Conversely, the US large commercial shipbuilders continue to struggle in reentering the large ship construction market.

The study group found that the military and commercial segments of the market are quite different and that a successful *large* commercial shipbuilding industry is not fundamental to maintaining the naval capabilities essential to national security. An issue is whether the government should award construction contracts without regard to the effect on those shipyards building the nation's naval vessels. This study examined government's role in maintaining an economically viable, nonmilitary shipbuilding industry and provides policy recommendations, including approval of the OECD shipbuilding agreement.

The study team visited 11 domestic shipbuilding facilities on the Atlantic and Gulf Coasts, and 12 shipbuilders and related agencies and associations in Denmark, Germany, the Netherlands, and the United Kingdom.

## Shipbuilding Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/icaf/issbp.html>

### **Abstract:**

The purpose of this study of the shipbuilding industry was to answer two questions: Are the capacity and viability of the U.S.'s seven remaining shipyards sufficient to meet national security needs for both sealift assets and combatant vessels? Is it feasible for U.S. shipyards to compete in an international commercial market for oceangoing vessels as a means of preserving U.S. shipyard capacity, capability, and viability? To answer these questions the study team visited both U.S. and foreign shipyards; consulted personnel from the U.S. Navy, the primary customer of large U.S. shipyards; met with buyers of commercial ships; and examined the role of governments in the shipbuilding industry.

The capability and capacity to build large oceangoing vessels to respond to global threats, project U.S. power, and provide sealift is important to the objectives of the U.S. national security strategy. However, since the end of the Cold War, Navy downsizing, abandonment of the goal of a 600-ship Navy, and termination of orders for new ships has caused many U.S. shipyards to close their doors or to focus solely on ship repair. If even a few U.S. shipyards are to remain in business, they must begin to compete in the commercial shipbuilding market by streamlining their management structures, embracing the technological advances enjoyed by foreign shipbuilding firms, employing new manufacturing processes, and revitalizing the productivity of the labor force. The failure of the U.S. industry to achieve market share in commercial ship construction is largely attributable to a conscious decision by the shipyards to dedicate their resources to the significantly more lucrative market of U.S. Navy work over the last two decades.

Nevertheless, this study concludes that the current U.S. capacity to build and repair ships can support short term (1-5 years) national security resource requirements under the scenario that assumes two major regional conflicts. This capacity includes support for the construction of orders and projected orders for Navy combatants, auxiliaries, and strategic sealift vessels, both new construction, and commercial ship conversion--a more cost-effective alternative. Current capacity can support full surge and sustainment as delineated in the latest Mobility Requirements Study Bottom-Up Review Update. In the long term (1-21 years), the projections indicate that even if the shipbuilding capacity further shrinks to only five major building yards, capacity will still

## TECHNOLOGY AND INDUSTRIAL BASE SECTOR STUDIES

be sufficient to produce the number of new platforms necessary to replace the existing 300-ship Navy fleet.

## **Land Combat Systems Industry Study**

**Date:** 1998

**Source:** Industrial College of the Armed Forces  
National Defense University, Washington, DC

**Availability:** <http://www.ndu.edu/ndu/icaf>

### **Abstract:**

Our legacy (cold war) ground combat platforms represent the most technically sophisticated, lethal, and survivable fleet of weapon systems in any military force, past or present. Altogether, they underpin the viability of land warfare as a strategic tool. The current budget cycle represents a pivotal decision point in maintaining the wheeled and tracked land combat vehicle (LCV) industrial base. Low rates of production, myopic efficiency-based acquisition reforms, and a dwindling procurement budget have combined to drain much of the flexibility from the LCV industry. Tomorrow's "come as you are war" will not abide the long lead times necessary to "cold start" a suspended industry. The LCV industry must retain warm production lines to meet the uncertain requirements of future conflicts. Current low production rates and armored vehicle modernization programs must continue to preclude the disappearance of a crucial national asset—the LCV industrial base.

In the course of the study, the team visited 13 U.S. companies and Army installations, and 7 corporate sites in Austria, Canada, France, Germany, and UK.

## **Amphibious Assault Vehicle Aluminum Hull Capability Study**

**Date:** July 1997

**Source:** U.S. Marine Corps Systems Command  
Quantico, VA 22134-5010  
Phone: (703) 784-4550  
Bryan Prosser (703) 784-5421, X5011

**Availability:** For Official use Only; Proprietary Information

**Abstract:**

The AAV7A1 Amphibious Assault Vehicle is the newest assault amphibian in a family of vehicles that provides armor protection, command and control, and repair capabilities while transporting troops and cargo from ship to shore in difficult sea and land conditions.

Prior to issuing an RFP for the AAV Reliability, Availability, and Maintainability/Rebuild to Standard (RAM/RS) program, the Marine Corps asked the U.S. Army Industrial Engineering Activity to identify sources capable of (1) managing the entire program and (2) machining and welding stripped AAV aluminum alloy hulls. The assessment concluded that seven potential contractors, both Army depots and commercial suppliers, have, or can acquire, the required capabilities. Five of the seven potential suppliers have all of the required capabilities, appear financially stable, and were rated as low risk in achieving the AAV RAM/RS performance, cost, and schedule objectives. Two potential suppliers were rated as medium risk. The information provided in the assessment has become part of the program's source selection process.

## **Tactical Wheeled Vehicle Industrial Capability Assessment**

**Date:** February 1996

**Originating Agency:** Defense Contract Management Command  
Industrial Analysis Support Office  
Philadelphia, PA 19141

**Distribution Limitation:** For Official Use Only;  
Business Sensitive and Proprietary Information

**Abstract:**

This report was an analysis of the Tactical Wheeled Vehicle (TWV) industry. Four prime contractors manufacture commercial trucks and heavy equipment for commercial and defense consumers. Two of the companies were profitable, one recorded a net loss, and the fourth was not analyzed financially. Workload projections indicate that all prime contractors will remain in the industry to support planned programs. The supplier base is also commercially driven. The primary vehicles in this sector include: High Mobility Multipurpose Wheeled Vehicle; Heavy Expanded Mobility Tactical Truck; Heavy Equipment Transporter System; Family of Medium Tactical Vehicles. The capabilities to design and maintain TWV's are common in the commercial and heavy equipment industry. This report contains figures and tables identifying world market sales, foreign military sales and projected DoD requirements. Major subtier components have dual-use capability and are not endangered. Most subtiers are heavily dependent on commercial orders for viability. There are no significant barriers to military or commercial integration in the TWV sector.

### Land Combat Systems Industry Study Report 1996

**Date:** 1996

**Originating Agency::** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/icafe/isics.html>

**Abstract:**

This study of the land combat systems (LCS) industry examines the structure, health, and outlook of the tracked and wheeled vehicle industry sectors, encompassing the numerous configurations of combat, combat support, and transportation systems for the two chassis types. Land combat systems (LCS) are at the core of the nation's ability to defend or occupy territory. The U.S. national security strategy is built upon the ability to back up diplomacy with the full spectrum of military action anywhere in the world. Without a viable land combat force, the United States cannot implement that strategy.

Developing the appropriate balance of defensive protection and high-technology offensive capabilities requires a sophisticated government/industry development team. The technologies required are inconsistent with commercial vehicle manufacturing and combat systems require specialized materials produced in low quantities. However, changing world scenarios over the past several years have allowed U.S. leaders to shift budgetary resources away from defense procurement. One result is a significantly smaller LCS industrial base that is looking to a cooperative partnership with the government and a vision crafted by the government for its survival.

The study team concluded that:

- LCS industries are coping with cutbacks in defense spending by downsizing, consolidating, merging, and, to the extent possible, integrating commercial and military production facilities.
- These conditions result in the loss of skilled workers, a higher per-unit cost due to low-rate production, and reductions in the supplier base.
- Upgrade programs and FMS contracts are marginally sustaining tracked-vehicle production.
- Ongoing and upcoming acquisition and rebuilding programs make for a brighter outlook for the wheeled-vehicle industry.
- International markets are open, but competition from foreign industry is tough.

The domestic industry will survive, but the government must cooperate if the U.S. is to preserve an affordable LCS production base. Government-industry partnerships will be an important part of optimizing program efficiencies with limited funds.

## Transportation Industry Study Report 1996

**Date:** 1996

**Originating Agency:** Industrial College of the Armed Forces  
National Defense University  
Washington, DC

**Distribution:** <http://www.ndu.edu/ndu/icaf/istra.html>

### **Abstract:**

Today's transportation industry is well positioned for global expansion and competition. All segments of the industry are currently profitable and are actively seeking faster, better, and more efficient ways to do business, including more ways to make multimodalism into true intermodalism. However, some near-term capacity shortfalls and mobilization issues must be resolved to ensure that the industry can continue to fulfill national security requirements for transportation into the next century.

Manufacturers, movers of raw materials and finished goods throughout the global marketplace, and the armed forces providing manpower, equipment, supplies, and support to humanitarian efforts or hostilities around the globe all need safe, reliable transportation. This study reviewed the four major modes of transportation -air, sea, rail, and truck - each of which has its own industry structure, assets, and capabilities. It then examined how well the modes work together to provide seamless transportation for both commercial and military movements. Finally, current and potential industry capacity were compared with the national security transportation requirements validated in the 1995 Mobility Requirements Study Bottom-Up Review Update.

The U.S. transportation industry is healthy and growing stronger. As intermodalism becomes inculcated into business practices, all segments of the industry will synergistically interact to provide seamless service at an efficient and cost-effective rate. Working together, the country's organic military and commercial transportation assets provide most of the lift required to support the two major regional conflicts (MRCs) scenario. The shortfalls that do exist have been specifically addressed by the current administration and will, for the most part, be rectified by acquisition of the C-17 aircraft and additional large, medium-speed roll-on/roll-off vessels. Finally, the government has a definite role to play in repairing or replacing the nation's aging transportation infrastructure. While there is some room for improvement, our study concluded that the United States is the world leader in transportation and will remain so as the nation moves into the next century.

### U.S. R&D Policy for Competitiveness Sector Study: Automotive

**Date:** 1996

**Originating Agency:** National Institute of Standards and Technology (NIST)

**Distribution:** [http://nii.nist.gov/pubs/coc\\_rd/apdx\\_auto.html](http://nii.nist.gov/pubs/coc_rd/apdx_auto.html)  
Council on Competitiveness, (202) 682-4292

**Abstract:**

The automotive industry is a crucial part of the American economy. The largest manufacturing industry in North America, it accounts for 4 percent to 5 percent of the U.S. Gross Domestic Product (GDP). Aggregate research and development (R&D) spending by the Big Three (Chrysler, Ford, and General Motors) has grown steadily over the past decade, driven by rising development costs. Most R&D spending is tied to the development of products, but the share devoted to improving the manufacturing process has increased over the past five years and is expected to continue to grow as companies recognize the need both to break down barriers between research, design and manufacturing, and to speed products to market.

Partnership for a New Generation of Vehicles (PNGV), perhaps the most ambitious of United States Council for Automotive Research's (U.S.CAR) projects, is designed to bring both corporate and government researchers together. The government did not commit any new funds to PNGV initially, but instead redistributed several million dollars spent on R&D relevant to the auto industry across several government agencies. The Department of Energy's (DOE) national laboratories have been the most active government participants in PNGV, establishing a Clean Car Coordinating Committee to manage their involvement. Industry and government researchers are spending more time in each other's facilities, and the companies have discovered use in the labs' valuable instrumentation, test equipment and expertise.

Partnerships are likely to become even more important in the coming years. Suppliers are developing the underlying technologies for an Intelligent Vehicle Highway System (IVHS), which has the potential to vastly improve traffic flow. IVHS would also require a large government investment in both research and infrastructure improvements, but the federal funding for intelligent vehicle and highway research is slated to expire in 1997. Automakers are reluctant to invest in IVHS technology absent a long-term government commitment, but partnerships with suppliers, universities, government labs and each other are likely to increase as companies strive to create the next generation of vehicles in the most efficient ways possible.